Exhibit 4

STANDARD-SETTING AND THE FAILURE OF PRICE COMPETITION

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INTRODUCTION

Standard-setting organizations (SSOs) play a central role in the new economy, facilitating technological interoperability, commercialization, and downstream competition.[1] Such organizations abound, from the American National Standards Institute, which promotes model standards for all U.S. businesses, to the JEDEC Solid State Technology Association, which engages in standardization for the semiconductor industry.[2] Within these entities, rival companies meet to establish industry-wide compatibility with given technologies—a process known as "de jure standardization"—which allows all industry participants to market harmonious goods.[3] This is a most laudable goal, given the myriad inefficiencies that may ensue when conflicting, though substitutable, technologies are offered to consumers.

Unfortunately, the operation of SSOs may be complicated by intellectual property rights that cover candidate standards. In the presence of requisite patented technology, these organizations and their members need to ensure that the relevant patentees agree to license at a royalty rate that accurately reflects the value of their technologies. If an SSO selects a standard without acquiring a royalty-specific licensing commitment from prospective licensors, the intellectual property holders whose rights are subsequently infringed will rationally demand licensing fees in excess of what an SSO would have agreed to ex ante.[4] This artificial pecuniary extraction is made possible by the impact of ex post hold-up—while there may have been numerous substitute technologies available to an

1. Mark A. Lemley, *Intellectual Property Rights and Standard-Setting Organizations*, 90 CAL. L. REV. 1889, 1896–98 (2002); George S. Cary et al., *Antitrust Implications of Abuse of Standard-Setting*, 15 GEO. MASON L. REV. 1241, 1241 (2008); Joseph Scott Miller, *Standard Setting, Patents, and Access Lock-In: RAND Licensing and the Theory of the Firm*, 40 IND. L. REV. 351, 351 (2007). *See generally* Alden F. Abbott, Assoc. Dir. for Policy and Coordination, Fed. Trade Comm'n., Remarks Before the APEC High-Level Symposium on IPR, The Harmonization of Intellectual Property Rights and Competition Policy: A Unified Approach to Economic Progress (Sept. 8, 2005), *available at* http://www.ftc.gov/bc/international/docs/abbottipchina.pdf.

2. Professor Lemley has defined a standard for these purposes as "any set of technical specifications that either provides or is intended to provide a common design for a product or process." Lemley, *supra* note 1, at 1896.

3. *See, e.g.*, Richard T. Rapp & Lauren J. Stiroh, Standard Setting and Market Power, Joint Hearings of the United States Department of Justice and the Federal Trade Commission, Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy 2 (Apr. 18, 2002), *available at* http://www.ftc.gov/opp/intellect/020418rappstiroh.pdf.

4. A royalty-specific licensing commitment in this context would entail an assurance to make intellectual property available at a specific price.

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SSO in creating a standard ex ante, by the time a standard has been chosen and the industry locks in, all previous substitutes have been eliminated.[5] Given a patentee's ability either to enjoin production or to impose costly litigation on an alleged infringer, the monopolist intellectual property (IP) holder may be able to extract royalties that are vastly disproportionate to the ex ante value of the licensed technology.[6] The price effect of this phenomenon is apt to be pronounced. This constitutes a harmful form of double marginalization, which results in higher prices for consumers, deadweight loss, and allocative inefficiency. The promotion of competition between holders of substitute patents is therefore an important component of an efficient standardization process, as such rivalry serves to ensure that the cost of complying with the ensuing standard does not exceed socially optimal levels.

Despite the unquestioned benefit of SSOs in at least some settings,[7] their unconstrained operation poses a variety of potential threats. Most obviously, their presence would appear to contradict well-established norms of antitrust policy; in particular, that aspect of the law which tracks Adam Smith's confident proclamation that little good can come from competitors' meeting.[8] Given that the process of de jure standardization necessarily violates this landmark principle, a considerable tension has emerged between facilitating meaningful price competition between purveyors of competing technology and ensuring that those same entities do not transform the SSO process into a vehicle for downstream collusion.

Unfortunately, this tension has given way to a wholly skewed result. In its haste to avoid harm, the government has created antitrust laws that perversely and unintentionally foreclose the very ben-

5. *See* CARL SHAPIRO & HAL R. VARIAN, INFORMATION RULES: A STRATEGIC GUIDE TO THE NETWORK ECONOMY 241 (1999) (defining a reasonable royalty rate as one "that the patent holder could obtain in open, up-front competition with other technologies, not the royalties that the patent holder can extract once other participants are effectively locked in to use technology covered by the patent").

6. *See* Mark A. Lemley, *Ten Things to Do About Patent Holdup of Standards (and One* Not *to)*, 48 B.C. L. REV. 149, 153 (2007).

7. *See* discussion *infra* Part I.B.

8. *See* DENNIS W. CARLTON & JEFFREY M. PERLOFF, MODERN INDUSTRIAL ORGANIZATION 122 (Pearson Addison Wesley 4th ed. 2005) ("People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices. It is impossible indeed to prevent such meetings, by any law which either could be executed, or would be consistent with liberty and justice. But though the law cannot hinder people of the same trade from sometimes assembling together, it ought to do nothing to facilitate such assemblies; much less to render them necessary.") (quoting Adam Smith).

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efits they were designed to achieve. More specifically, these laws have led to a dearth of ex ante royalty competition between owners of substitute technologies in the standard-setting process.[9] Fearing antitrust liability for discussing royalties, SSOs forego the benefit of acquiring ex ante contractual commitments from IP holders to license their technology at specific rates.[10]

Concluding that contemporary antitrust rules create an excessive risk of inadvertent liability, SSOs instead look to another tool to constrain the problem of ex post hold-up. Such entities now routinely require their members to license their IP rights at "reasonable and nondiscriminatory" (RAND) rates.[11] SSO's predisposition to rely on such RAND assurances constitutes the focal point of this Article's analysis. The Article explores the nature of the SSO process, the potentially vital role played by ex ante royalty competition between purveyors of rival technologies, the efficacy of RAND as a substitute for such competition, and the numerous repercussions of that analysis.

What to make of RAND licensing assurances? By their explicit terms, such ex ante commitments would seem to foreclose the threat of ex post monopoly surcharge. If a patentee cannot refuse to license its IP, cannot charge different SSO members different royalties, cannot enjoin infringement, and cannot in any event require royalties greater than a "reasonable" level, by definition it cannot extract a monopoly return once an industry has locked into an infringing standard. So construed, the practice of RAND licensing would seem to solve the problem entirely, assuming of course that the courts enforce such commitments. An ostensibly important component of bestowing legal force on RAND assurances would be antitrust liability for deliberate violations of such guarantees. Consistent with this, the Third Circuit held in 2007 that an SSO member's conscious decision to renege on its prior assurance to license its IP on reasonable terms amounted to a violation of the Sherman Act.[12] Such law seemingly gives force to an important and worthy check on abuse of the SSO process through hold-up.

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9. *See* Lemley, *supra* note 1, at 1964–65; Patrick D. Curran, Comment, *Standard-Setting Organizations: Patents, Price Fixing, and Per Se Legality*, 70 U. CHI. L. REV. 983, 991–92 (2003).

10. *See* Curran, *supra* note 9, at 991–92.

11. *See* Miller, *supra* note 1, at 353.

12. Broadcom Corp. v. Qualcomm Inc., 501 F.3d 297, 314 (3d Cir. 2007) (holding that a patentee's breach of an agreement to license on RAND terms can constitute an antitrust violation).

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Unfortunately, the idyllic picture of RAND licensing as an effective constraint on ex post monopoly is illusory.[13] While steps could be taken within an SSO to bestow the concept with some limited form of objectivity and force,[14] there is simply no getting around the fact that "reasonable" is a nebulous concept in many information markets. Although the absence of a price term has long been held inadequate to deprive an otherwise valid contract of enforceability, since a court can simply inject a "reasonable" price,[15] this tenet of the law operates well only insofar as there is an established market for the subject matter of the contract. Commodities contracts, for instance, lend themselves well to the external definition of a typically negotiated price. In contrast, fast-paced high-technology markets for patented inventions of unique and idiosyncratic importance are often not conducive to the unilateral determination of price. Insofar as RAND commitments seek to pose a meaningful constraint on ex post monopoly pricing in such settings, they are most unlikely to be effective. Compounding this shortcoming is the fact that nebulous licensing assurances like RAND—even if ultimately enforceable in court—impose painful ex post litigation costs in an environment of uncertainty.[16]

As it is unlikely that the law can inject much-needed definition into the RAND concept,[17] the optimal solution may paradoxically be to eviscerate it further.[18] Maintaining the status quo—in which

13. *See* Robert A. Skitol, *Concerted Buying Power: Its Potential for Addressing the Patent Holdup Problem in Standard Setting*, 72 ANTITRUST L.J. 727, 728–29 (2005). *Contra* Cary et al., *supra* note 1, at 1259–60 (arguing that RAND commitments ensure "that the licensing terms and royalties charged by an essential patent holder ex post are commensurate with the competitive terms that would have applied ex ante").

14. For instance, the creation of expert adjudicative panels composed of individuals familiar with industry norms and pricing practices, which could be used to solve disputes concerning the meaning of "reasonable" in a particular market, could provide a partial—though still inadequate—solution.

15. *See* U.C.C. § 2-305(1) (2003) ("The parties if they so intend can conclude a contract for sale even though the price is not settled. In such a case the price is a reasonable price at the time for delivery . . . .").

16. *See* Curran, *supra* note 9, at 992–94.

17. For an effort to create a manageable framework for defining RAND licensing terms, see generally Anne Layne-Farrar et al., *Pricing Patents for Licensing in Standard-Setting Organizations: Making Sense of FRAND Commitments*, 74 ANTITRUST L.J. 671 (2007).

18. As explored below, RAND assurances can create a meaningful constraint against ex post hold-up if it is construed—as some commentators urge—as depriving patentees of the right to an injunction. *See, e.g.*, Jonathan L. Rubin, *Patents, Antitrust, and Rivalry in Standard-Setting*, 38 RUTGERS L.J. 509, 531 (2007). The loss of this ability essentially creates a compulsory license, whereby an infringer can

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SSO members apparently believe that the concept has some rudimentary value[19]—is highly inefficient.[20] Further undermining the legal force of RAND requirements will tilt the relevant calculus in favor of ex ante royalty competition, which is to be preferred for the many reasons discussed *infra*.[21]

The latest, and arguably most important, in a series of decisions implicating this goal is the D.C. Circuit's 2008 *Rambus* decision.[22] There, the court held that an SSO's loss of an opportunity to obtain RAND assurances from a member does not give rise to an antitrust violation, even if that loss emanated exclusively from the member's deceit.[23] In doing so, the court necessarily undermined the already indeterminate concept of contractual RAND commitments. The court's move—though based on a questionable premise—will affect the incentives of prospective SSO members in important ways, both negatively and positively. In the former regard, industry participants may be slower to form SSOs, believing that their ability to protect themselves against ex post hold-up is diminished. In the latter respect, it elevates the incentive for SSO members to elect standards based on ex ante royalty-based competition. Coupled with recent attempts to moderate the potentially harsh application of antitrust law to such ex ante negotiation,[24] the D.C. Circuit may have unconsciously sown the seed for significant

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simply use the patented invention in the event of a bargaining break-down and let the courts set a price. However, it is not the case that construing RAND in this way is necessarily desirable. De facto compulsory licenses create significant ex post litigation costs that not only harm society directly, but dissuade entry into, and reliance upon, the SSO process. More fundamentally still, the loss of an injunction due to RAND commitments fails to prevent the relevant patentee from extracting supracompetitive royalties ex post. Given the commonly expressed concern that courts routinely overcompensate holders of infringed patents, in addition to the fact that a prospective licensee will rationally pay a premium to avoid costly litigation, IP holders subject to RAND obligations will still be able to extract significantly higher royalties ex post than they would have been able to ex ante (assuming the presence of substitute technologies).

19. A value sufficient to serve as a second-best substitute for ex ante competition.

20. As noted, the sole benefit of RAND licensing should be to deprive the relevant patentee of the right to enjoin use of the infringing standard. The loss of such a legal right dilutes the opportunity for hold-out, but unfortunately does not prevent higher royalties being charged ex post than could have been extracted ex ante.

21. *See* discussion *infra* Part II.A.

22. Rambus Inc. v. FTC, 522 F.3d 456 (D.C. Cir. 2008), *cert. denied* 129 S. Ct. 1318 (2009).

23. *Id.* at 466–67.

24. *See* discussion *infra* Part III.C.

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improvement in SSO performance. Nevertheless, *Rambus* represents something of a failed opportunity, given the court's laconic treatment of the RAND issue itself and implicit suggestion that such licensing commitments can exert significant downward pressure on price in an ex post context. Both aspects of the decision are disappointing.

Industries' systemic fear of engaging in ex ante royalty competition must be tempered through a suitable moderation in the antitrust laws. The challenge is simultaneously to display the temperance needed to induce SSOs to require royalty-based competition and yet foreclose damaging instances of collusion. In this respect, enforcement agencies have issued much-needed assurances that bilateral intra-SSO ex ante royalty negotiations will be judged under the rule of reason,[25] and not construed as per se illegal price fixing. In addition, Congress recently created a qualified immunity from treble damage liability for antitrust violations within an SSO.[26]

Such developments are laudable, but further steps are needed. In particular, there should be an explicit safe harbor provision for SSOs that require prospective licensors to declare their most restrictive licensing terms, including the highest royalty rate, ex ante. The rule of reason should continue to apply with regard to bilateral negotiations within an SSO, both because the danger of collusion in that context is systemic and because such negotiations are generally (though not necessarily) inferior to ex ante pronouncements of maximum royalty rates. While the former process may deliver specific royalties, which eliminate the need for costly ex post negotiation, its time-consuming and impeding nature may unacceptably

25. Justice Brandeis gave the rule of reason inquiry its classic definition in 1918. *See* Chicago Bd. of Trade v. United States, 246 U.S. 231, 238 (1918) ("The true test of legality is whether the restraint imposed is such as merely regulates and perhaps thereby promotes competition or whether it is such as may suppress or even destroy competition. To determine that question the court must ordinarily consider the facts peculiar to the business to which the restraint is applied; its condition before and after the restraint was imposed; the nature of the restraint and its effect, actual or probable. The history of the restraint, the evil believed to exist, the reason for adopting the particular remedy, the purpose or end sought to be attained, are all relevant facts. This is not because a good intention will save an otherwise objectionable regulation or the reverse; but because knowledge of intent may help the court to interpret facts and to predict consequences."). For a more succinct definition, see Nat'l Soc'y of Prof'l Eng'rs v. United States, 435 U.S. 679, 688 (1978).

26. *See* 15 U.S.C. § 15(a) (2006) (allowing for treble damages recovery in antitrust cases); 15 U.S.C. § 4302 (2006) ("In any action under the antitrust laws . . . the conduct of . . . a standards development organization while engaged in a standards development activity, shall not be deemed illegal per se . . . .").

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delay the process of standardization. The latter avenue allows SSOs to make informed choices in selecting one standard over another, knowing the maximum possible cost of complying with each. Simultaneously, the lack of ex ante negotiation allows the relevant SSO to get to work as expeditiously as possible.

Part I briefly explains the economics of "winner-takes-all" markets, the relative virtues and dangers of standardization through private arrangement and open market competition, and the compelling need for SSOs in at least some circumstances. Part II explores the potentially critical role of royalty-based competition in the standardization process, highlights the contemporary absence of such rivalry in the SSO context, and explains the inefficacious "solution" that has emerged in the form of RAND licensing. Part III seeks to define optimal antitrust policy toward ex ante royalty negotiations and then charts recent legal developments that have sought to remedy the problem. In particular, the Article focuses on the D.C. Circuit's important *Rambus* decision.[27] In conjunction with congressional and executive attempts to temper the threat of antitrust enforcement in this area, the decision could conceivably pave the way for a more pervasive embrace of royalty-based competition.[28] Nevertheless, the Article concludes by suggesting that a number of additional measures should be adopted.

I.
NETWORK EFFECTS, STANDARDIZATION, AND EFFICIENT COMPETITION

It would be difficult to underestimate the contemporary importance of standardization.[29] Technological, functional, and safety-related standards are ubiquitous in the modern world.[30] From electrical plug sockets to HD-video format to Internet protocols and beyond, standardization is prevalent and bears axiomatic value. From an economic perspective, the interoperability facilitated by standardization enables society to benefit from both producer- and consumer-side scale economies.[31] The need for standardization

27. *Rambus*, 522 F.3d 456.

28. *See* discussion *infra* Part III.B.

29. *See* Lemley, *supra* note 1, at 1892 ("Without standardization there wouldn't be a modern economy.") (quoting James Surowiecki, *Turn of the Century*, WIRED, Jan. 2002, at 85, *available at* http://www.wired.com/wired/archive/10.01/standards.html).

30. *See* Lemley, *supra* note 1, at 1896–1901.

31. *Id.* at 1896–97. Homogeneous voltage and socket formats, for instance, allow U.S. consumers to use electrical goods anywhere in the country, increasing

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thus increases in proportion to the presence and power of network effects.[32] Where such effects are sufficiently pronounced, the benefits of adhering to a single standard may be so overwhelming that the relevant market will be predisposed to bearing just one.[33] This point is neither recondite nor abstruse. There is a reason why the market often refuses to accommodate two competing standards, whether in the form of VHS and Beta or, more recently, HD-DVD and Blu-ray. As the number of people using a standard increases, the expanding interoperability heightens the value of the relevant good to the marginal purchaser. Where the benefits are sufficiently strong, monopoly inevitably follows.[34]

Given that the virtues of standardization are pronounced in certain settings, two major questions ensue. First, how does one define an optimal standard in the face of competing alternatives? Second, who is best placed to select that standard?

A. *Network Externalities, Interoperability, and Information Markets*

Turning first to the question of choosing an optimal standard, the predicate issue is one of definition. As with the economic concept of qualitative superiority in other contexts, the best technical standard may be defined as that which yields the best technology at the lowest cost.[35] Technological supremacy can obviously best be defined by scientists and engineers familiar with the relevant industry. The cost issue lies in the possible existence of substitute technologies that may be subject to proprietary control. The presence of such property rights can readily lead to the kind of royalty stack-

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demand for those goods, which in turn benefits manufacturers. Heterogeneous standards would force sellers to carry otherwise identical goods with myriad compatibilities without any concomitant efficiency gain.

32. Direct network effects, alternatively known as positive externalities in consumption, arise whenever the utility enjoyed by a consumer of a good increases in response to an increase in the number of other users of the same good. Indirect network effects arise when an increase in the number of consumers of a product spurs the creation and manufacture of complementary products. Such externalities in consumption form a "positive feedback loop." The result is that the same product can experience vastly different consumer demand depending on the level of market share it commands, if the market displays powerful direct or indirect network externalities.

33. *See* Michael L. Katz & Carl Shapiro, *Network Externalities, Competition, and Compatibility*, 75 AM. ECON. REV. 424 *passim* (1985).

34. *See id.*

35. *See* CARLTON & PERLOFF, *supra* note 8, at 70 (defining consumer surplus as "the amount above the price paid that a consumer would willingly spend, if necessary, to consume the units purchased" and noting that a "good's demand curve reflects the value that consumers place on [it]").

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ing that may frustrate the emergence of optimal technologies.[36] By spurring royalty competition between the owners of rival technologies, standard-setting bodies could permit society to reap the benefit of the same invention being incorporated into a standard, but at lower cost.

The royalty issue is therefore significant. Antitrust is commonly understood to promote consumer welfare, defined primarily as the difference between price and demand in the downstream market.[37] Standards that are subject to proprietary control will yield increased prices, and thus diminished consumer welfare.[38] Thus, *ceteris paribus*, the better of two technologically equivalent standards is that which will be made available to industry participants at the lowest cost.

This discussion begs an important question: Are open standards necessarily superior to closed ones, which are subject to proprietary control? Given that open standards are, by definition, free from cost, one might suspect that the answer is yes. The reality is rather more complicated, however, and reflects the danger of monopsony.[39] If IP holders are forced to license their technology at zero cost against their will, long-run inefficiencies will ensue due to inadequate ex post return on innovation.[40] For this reason, antitrust law typically prevents SSOs from refusing to consider IP-protected technology.[41]

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36. The quintessential example is provided by the semiconductor industry, where one wishing to market a product may need the permission of holders of thousands of patents. *See* Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1627–29 (2003).

37. *See* CARLTON & PERLOFF, *supra* note 8, at 70 (defining consumer surplus as "the amount above the price paid that a consumer would willingly spend, if necessary, to consume the units purchased").

38. This is obviously so where upstream royalties are charged with regard to each downstream sale to consumers, which would directly increase the downstream marginal cost of production and, thus, the price. Even where upstream royalties take the form of a single, upfront payment—in other words, a fixed cost—downstream price rises may nevertheless occur due to decreased entry into the market on the supply-side.

39. *See* CARLTON & PERLOFF, *supra* note 8, at 107–10 (explaining the economics of monopsony, in which purchasers have market power and force the price below the competitive level).

40. Indeed, it is commonly understood that the sole purpose of the U.S. intellectual property regime is utilitarian, that is, to create sufficient ex post reward to induce socially desirable levels of ex ante innovation. *See, e.g.*, Yochai Benkler, *Siren Songs and Amish Children: Autonomy, Information, and Law*, 76 N.Y.U. L. REV. 23, 59 (2001) (noting that "the basic ideological commitment of American intellectual property is actually heavily utilitarian").

41. *See* Lemley, *supra* note 1, at 1944–45 nn.232–33.

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If open standards (i.e., those free from proprietary control) are not definitively and categorically optimal, how should society define the appropriate access price? The optimal royalty rate for a piece of proprietary technology is that which provides a sufficient ex post return to a patentee to compensate it for the expense, opportunity cost, and risk involved in ex ante innovation. In other words, an inventor's pecuniary return should be adequate to have spurred investment in the innovation in the first place. This rate is typically neither observable nor calculable because society lacks means to compare (or even identify) the minimal pecuniary return required by each individual innovator to the amount ultimately awarded him. In lieu of this ability, society generally relies on the market to define an appropriate price. As applied to the SSO setting, then, the right price is that which would be negotiated by an SSO and the relevant patentee in the presence of all available alternative technologies. But an SSO's insistence on royalty-free licensing may be undesirable with respect to technological innovation in the long run if other forms of compensation to the patentee are not forthcoming.

Nevertheless, this concern does not mean that royalty-free settings are necessarily objectionable. If open standards emerge voluntarily, either due to complementary effects in related markets or pursuant to broader portfolio cross-licensing agreements (in which patentees agree to license their respective technologies to one another), they surely represent the optimal outcome.[42] A balance must be struck between the immediate short-run boon to consumers from open standards, on the one hand, and ensuring that IP holders derive a sufficient pecuniary return to compensate them for their innovation, on the other.

B. The Relative Virtues of De Facto and Collective Standardization

Having defined the optimal standard as that which presents the best technology at the lowest price—subject only to monopsony concerns—the crucial issue is who is best placed to make a determination of superiority. As a practical matter, the choice can be made in two ways. First, owners of different standards can compete for supremacy in the open market and thus allow consumers to select the optimal one ("de facto" standardization).[43] Second, competi-

42. *See* U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, ANTITRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS: PROMOTING INNOVATION AND COMPETITION 41 (2007) [hereinafter *Promoting Innovation and Competition*].

43. *See* Lemley, *supra* note 1, at 1899. Also, the government can unilaterally establish a standard, as it did with regard to high definition television. *Id.* In as-

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tors in an industry can act in a concerted fashion to define the optimal standard.[44] Each approach has distinct advantages and weaknesses.

One might immediately favor de facto standardization given its facilitation of price competition. Horizontal, collaborative standardization results in a dearth of royalty competition, with negative results for innovation and consumer welfare. Thus, why not require rivals to compete in the open market for technological supremacy by prohibiting inter-rival standardization altogether?[45]

There is some intuitive force to this suggestion, which challenges the conceptual foundation of standards being selected by rivals, rather than by the market and consumers. When competitors seek to define what the market would otherwise establish, one would expect competition law to greet rivals' invocation of "inefficient competition" with some skepticism.[46] Even omitting the possibility of downstream collusion, private arrangements in which competing purveyors of technology preempt consumer choice would appear deserving of similar treatment. This conclusion would be bolstered by the observation that free markets are demonstrably capable of yielding a victor in a standard war, and doing so without separating qualitative criteria from the allocative efficiency associated with open competition.[47] With clear winners having

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sessing which avenue is best suited to correctly defining the finest standard, however, the Article omits governmental action and judges the choice of collective and open market standardization under the separate rubrics of quality, price, and efficiency. This omission is quite purposeful, reflecting the commonly held view that government intervention in the standard-setting process is inevitably undesirable. *See* OZ SHY, THE ECONOMICS OF NETWORK INDUSTRIES 6 (2001).

44. Lemley, *supra* note 1, at 1898.

45. This need not be an outrageous question, assuming that its reach is limited to prohibiting SSOs that would likely result in a single industry standard. Open market-based competition between rival standards often involves competing standards developed by rival standard-setting groups. Royalty-based competition ought not to be a problem in these settings, as inter-substitute technology competition would require IP holders to reduce their licensing fees to increase consumer demand. Thus, the issue is whether SSOs whose members' market share and technologies ensure sufficient tipping effects to monopolize the market should be prohibited in order to protect royalty competition.

46. Competitors' pleas that their actions should not be condemned on the ground that competition was "ruinous" have always been rejected. *See, e.g.*, United States v. Trans-Missouri Freight Ass'n, 166 U.S. 290, 339 (1897) (rejecting the defendants' argument that absent the cartel they would be subject to ruinous competition).

47. To appreciate this, one need merely reference the recent standards war between HD-DVD and Blu-ray, or more distant, though no less fierce, competition between Microsoft and rival operating systems, VHS and Beta, or QWERTY and its

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emerged in many cases,[48] and with at least some reason to believe that the optimal technology has been adopted every time,[49] one might doubt the need for rivals to bypass that competition and collectively to anoint a victor.

Although there may be some initial appeal for discarding the SSO process, such a position would be unquestionably erroneous. Overwhelming policy grounds support the operation of SSOs in at least some instances. In particular, network effects that inexorably tip certain information markets toward monopolization threaten a priori assumptions that objectively superior technologies prevail in open competition.[50] "Path dependence"—the theory that positive externalities in consumption may trigger the adoption of inferior standards—suggests that ex ante qualitative competition facilitated by an SSO may be categorically superior to ex post, open market rivalry.[51] If consumers' adoption of a particular technology is driven not by technological primacy or price, but by mere "first mover advantage," profound normative questions are implicated.[52] If consumers are incapable of reliably choosing optimal standards, perhaps industry should itself determine technological supremacy and create a standard accordingly.

Bypassing consumer myopia is not the only benefit of the SSO process. In particular, the universal adoption of an industry stan-

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rivals. The list goes on, but in every case private purveyors of technology marketed their goods directly to consumers, competing on the basis of price and quality.

48. Whether a market will support only one standard depends on the network effects at issue. There are many examples of industries in which rival standards can viably compete over time, notwithstanding positive externalities in consumption. For instance, GSM and CDMA are the two major competing network technologies, which compete for the business of cellular carriers. Open market competition continues to rage between these substitute standards. In the video games industry, the market can support Nintendo Wii, Xbox 360, and Playstation 3. Where network effects are sufficiently strong, however, the dominance of one standard is inevitable. A contemporary example would be the recent victory of Blu-ray over HD-DVD.

49. *See* STAN J. LIEBOWITZ & STEPHEN E. MARGOLIS, WINNERS, LOSERS & MICROSOFT: COMPETITION AND ANTITRUST IN HIGH TECHNOLOGY 55–56 (1999) (arguing that "path dependence" can be overcome by a fringe entrant's internalization of the social benefits of the standard being offered).

50. *See* Katz & Shapiro, *supra* note 33, *passim* (opining that the presence of network effects, coupled with consumers' expectations, can lead to multiple equilibria, with the resulting possibility that a market may yield an inferior product); Joseph Farrell & Garth Saloner, *Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation*, 76 AM. ECON. REV. 940 (1986) (arguing that excess inertia may lead a market not to adopt a novel technology).

51. *Id.*

52. *Id.*

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dard foregoes the otherwise wasted, fixed capital that would have been devoted to commercializing doomed standards.[53] The cost so saved is apt to be significant, given the economic prediction that winner-takes-all industry structures induce excessive rates of entry.[54] Additionally, standards wars create aggregate welfare losses caused by consumers' hesitancy to purchase a product that may be rendered defunct by the subsequent success of a rival standard.[55] Moreover, the SSO context makes possible what open market competition never would; namely, the emergence of open, non-proprietary standards.[56] While not every inventor of a valuable technology will be willing to license its IP at zero price, royalty-free licensing takes place on a larger scale than one might imagine.[57] This often occurs due to the complementary effects generated by reducing the price of the standardized technology (particularly at the infrastructure level of a market), thus maximizing consumer demand for the downstream product.[58] Representatively, open standards have become a hallmark of Internet-based technologies.[59] This should not be surprising. When all industry members participate in an SSO, each entity will internalize the value of its licensing technology to other members at a zero royalty rate. This is because the chosen standard will necessarily be made available to all. In a standards war, however, the victor will obviously enforce property rights over the prevailing technology. As a result, open standards will not result from de facto standardization, even in the presence of powerful complementary effects.

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53. An axiomatic objection to de facto standardization lies in the fact that any investments in technologies that turn out not to succeed are wasted. In this way, the socially optimal route is to pre-select the optimal standard and spend capital on developing that platform only.

54. *See, e.g.*, Urs Fischbacher & Christian Thöni, *Excess Entry in an Experimental Winner-Take-All Market*, 67 J. ECON. BEHAVIOR & ORG. 150, 150 (2008).

55. The author notes with some regret that he purchased a HD-DVD player in the weeks leading up to the market's overnight decision to tip toward Blu-ray technology.

56. *See* Lemley, *supra* note 1, at 1902; Peter Lee, *The Evolution of Intellectual Infrastructure*, 83 WASH. L. REV. 39, 96 (2008).

57. *See* Lee, *supra* note 56, at 96.

58. *See Promoting Innovation and Competition*, *supra* note 42, at 41. Such effects would not materialize in an environment of de facto standardization, where the prevailing technology will surely be closed to enable recoupment.

59. It should be noted, however, that open standards are not universally desirable, given that they bear the potential to represent the very worst kind of monopsony power. If an SSO is able to reduce the royalties it must pay for infringing patents below the competitive level, social welfare losses will ensue.

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Finally, standardization facilitates a navigable path through the infamous "patent thicket."[60] Given the proliferation of overlapping patents, companies wishing to market goods in certain high-technology markets may need to infringe myriad patents to bring their products to market.[61] As each patentee has a legal ability to enjoin production or extract disproportionate social wealth in the form of rent-seeking, a seller must negotiate an overwhelming number of licenses from a considerably disadvantageous bargaining position.[62] The result is a tragedy of the anti-commons that ironically sees rights that were awarded to spur innovation instead foreclosing follow-on invention and commercialization.[63] Navigating a way through the patent thicket has led companies operating in such markets to adopt a range of tactics, including entering into portfolio cross-licensing agreements and patent pools.[64] Another potential way to clear a path, however, is through a standard-setting process.[65]

Thus, SSOs are clearly desirable in at least some instances. Moreover, even if the virtues of the SSO process were occasionally questionable, banning them altogether would merely have a limited effect on the problem of price. Although de facto standardization achieved through open market competition will bear witness to fierce ex ante price competition and largely bypass the danger of subsequent hold-up, it does nothing to solve the problem of ex post price increases. In other words, once the market elects a standard, there will be no ex ante commitment from IP holders to consumers to license at a low rate. Quite to the contrary, those patentees may increase the price at which they license their technology significantly, so as to recoup losses from the ex ante competition needed to induce consumer adoption of their standard.

In sum, there is an asymmetry between standardization achieved through open competition in the market and that created collaboratively in the form of an SSO. Private markets are categorically superior in the short run in yielding inter-standard royalty competition, but fail to provide a check against the fact of ex post

60. *See* Lemley, *supra* note 6, at 156.

61. *Id.* at 150.

62. *Id.* at 153.

63. *See* Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 HARV. L. REV. 621, 626 & n.20 (1998).

64. *See Promoting Innovation and Competition*, *supra* note 42, at 57–85.

65. *See* Damien Geradin et al., *The Complements Problem Within Standard Setting: Assessing the Evidence on Royalty Stacking*, 14 B.U. J. SCI. & TECH. L. 144, 153–54 (2008).

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monopoly pricing.[66] Whether private markets are effective in ensuring that the optimal standard is selected is, as noted, a matter of some controversy.[67] What is certain, however, is that de facto standardization can be immensely wasteful, resulting in inefficiencies beyond the loss of invested capital.

The major shortcoming to the SSO process is an obvious one, and is a danger systemic in any situation where horizontal competitors sit down with one another. As Part II explores, the danger of collusion has necessitated antitrust oversight to prevent disproportionate harm to consumers. Unfortunately, the antitrust "solution" has yielded a further harm, essentially stripping the SSO process of ex ante royalty competition. This unintended side effect is unacceptable and requires prompt correction. As will be explained, the SSOs' reaction in the form of requiring reasonable and nondiscriminatory pricing is far from sufficient. Part III explains how the absence of meaningful price competition within SSOs should be addressed without creating a legal environment that is conducive to nefarious instances of collusion.

II.
SSOs, THE PRICING DILEMMA, AND THE RAND "SOLUTION"

A. SSOs, Antitrust, and the Pricing Dilemma

Part I explained that the SSO process offers overriding advantages in at least some settings. In particular, it is capable of yielding an optimal standard through a mechanism that is subject to neither path dependence nor consumer myopia, and doing so without the inefficiency of foregone capital from failed investment.[68] Of course, an optimal standard may be defined on grounds beyond

66. This should be regarded as axiomatic. SSOs do not engage in royalty competition ex ante (the impetus for this Article), whereas de facto standardization involves rival standards competing with one another in the open market on the basis of price.

67. Many economists believe that the presence of strong network effects creates a powerful "first-mover advantage," a phenomenon otherwise known as "path dependence." Many scholars have argued that this phenomenon may anoint and perpetuate an inferior standard ("excess inertia") because even though a new potential technology being offered to the public is objectively superior, its lack of market share may render its value to the marginal consumer less than that of the preceding standard. Further entrenching the monopolist's technology is the switching cost associated with having to learn a new standard.

68. Such wasted investment occurs in commercialization. Before creating an SSO, the requisite technology for a standard certainly exists. The problem, of course, is that numerous standards could be used, given the technology (some IP-

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quality alone, so to be efficient a standard-selecting body must display sensitivity to the cost of complying with alternative standards. In order to operate effectively, therefore, an SSO must either know the royalty cost of various standards before making a selection or have an effective means of controlling cost ex post.

In the absence of either ability, the standard-setting process is vulnerable to ex post hold-up—an economic phenomenon that has escaped the attention of some courts.[69] The inefficiency results in the artificial acquisition of monopoly power, which may be obtained through lock-in.[70] Before an SSO makes a selection, there may be multiple possible standards or numerous IP-protected substitute technologies available for use in a single standard. In either event, relevant IP holders face competition from holders of rival technologies for inclusion in the relevant standard. In this ex ante setting, each IP holder has an incentive to compete vigorously over the royalty rate at which it is willing to make its technology available.[71] As in other contexts, competition leads to allocatively efficient outcomes.[72]

Absent such competition (or some externally imposed constraint), however, once an SSO selects what it deems the optimal standard, holders of IP rights that are infringed by the standard will be able to extract far greater royalties than are inherent in the substance of their technological contribution.[73] In the ex ante setting, their ability to raise royalties is limited by undercutting from rivals.[74] Once an industry selects a standard, however, IP holders will be able to demand fees subject only to the ceiling at which the industry would opt out of the standard. Given the fact of lock-in, an

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protected) already in existence. By using an SSO, an industry can agree on a standard without having to spend money on commercializing more than one.

69. *See, e.g.*, Townshend v. Rockwell Int'l Corp., No. C 99-0400 SBA, 2000 U.S. Dist. LEXIS 5070, at *37 (N.D. Cal. Mar. 28, 2000) (mistakenly concluding that "the adoption of a [sic] industry standard incorporating such proprietary technology does not confer any power to exclude that exceeds the exclusionary power to which a patent holder is otherwise legally entitled").

70. *See* Michael A. Carrier, *Why Antitrust Should Defer to the Intellectual Property Rules of Standard-Setting Organizations: A Commentary on Teece & Sherry*, 87 MINN. L. REV. 2019, 2024 (2003).

71. One assumes at this stage that the quality of an IP holder's technology is set at the time of competing for inclusion of a standard. Thus, rivals would expect to compete on the remaining factor that remains variable—namely, price.

72. *See* CARLTON & PERLOFF, *supra* note 8, at 70–73.

73. *See Promoting Innovation and Competition*, *supra* note 42, at 37–40.

74. *See, e.g.*, Gavin D. George, Note, *What is Hiding in the Bushes?* eBay's *Effect on Holdout Behavior in Patent Thickets*, 13 MICH. TELECOMM. & TECH. L. REV. 557, 559 (2007).

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